plummet or be wiped out entirely. Thus, sound scientific research is a critical component of evaluating the economic impacts of policies in both the "with" and "without" cases.

Issues in characterizing costs and benefits

Having introduced the basic idea of how we can evaluate the economic impact of a policy, we can now look at some considerations that must be made in characterizing benefits and costs. It is beyond the scope of this paper to present a full exposition of the economic theory behind the issues discussed here.[2] More thorough treatments can be found in the sources referenced.

Actions taken to protect or conserve environmental resources can affect economic values at many points in the chain leading from the natural resources themselves to producers and consumers. Changes in the final value of the goods and services produced can be caused by changes in the quality or quantity of the resource, the price and quality of goods that can substitute for or which complement the resource in their use, or in the nature of demand for the goods and services produced by users (their marginal value). Likewise, policies and programs can have an impact on any one or all of these factors in the value-generation process (Cropper and Oates, 1992).

Difficulty in identifying the impact of a policy on resources

In many cases the immediate effect of an environmental protection policy or project is a change in the quality or quantity of a resource - e.g., an increase in the number of acres of a particular type of habitat, or a decrease in the levels of pollutants in a body of water. As noted before, it may be quite difficult or costly to measure these effects. For instance, the water quality monitoring needs for a certain area may be scientifically straightforward, but it may be much harder to measure the impacts of water quality improvements on the productivity of fisheries.

Often, changes in quality and quantities of natural resources are affected by many different factors, and isolating the effect of a particular factor such as a policy may be difficult. In the case of protecting wetlands, for instance, a simple inventory of wetlands acquired by a public conservation agency does not by itself reveal the increase in benefits from the acquisitions.

A related problem is that it is difficult to define and separately characterize and measure the value of individual components of complex ecological systems. Again using the wetland

[2]Sources for general resource and environmental economics are Krutilla and Fisher (1975), Freeman (1979), Fisher (1981), Tietenberg (1988), and Cropper and Oates (1992). For shorter, less technical treatments of economic issues related to resource use see Batie and Shabman, 1981, and Scodari, 1990.